NOTICE

All drawings located at the end of the document.

LANL

Data Summary Report
IHSS Group 900-4&5

June 2003

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Data Summary Report
IHSS Group 900-4&5

Approval received from the Colorado Department of Public Health and Environment.

( )

Approval letter contained in the Administrative Record.

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ACRONYMS AND ABBREVIATIONS

AL	action level
AR	Administrative Record
CD	compact disk
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
DOE	U.S. Department of Energy
DQA	Data Quality Assessment
DQO	Data Quality Objective
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
HPGe	high purity germanium detector
HRR	Historical Release Report
IA	Industrial Area
IASAP	Industrial Area Sampling and Analysis Plan
IHSS	Individual Hazardous Substance Site
K-H	Kaiser-Hill Company L.L.C.
LCS	laboratory control sample
mg/kg	milligram per kilogram
MS	matrix spike
MSD	matrix spike duplicate
NA	not applicable
ND	not detected
NFA	No Further Action
NFAA	No Further Accelerated Action
PAC	Potential Area of Concern
PARCCS	precision, accuracy, representativeness, completeness, comparability, and sensitivity
pCi/g	picocurie per gram
POC	Point of Compliance
QA	quality assurance
QC	quality control
REC	percent recovered
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RIN	report identification number
RPD	relative percent difference
SD	standard deviation
SVOC	semi-volatile organic compound
SWD	Soil Water Database
µg/kg	microgram per kilogram
µg/L	microgram per liter
V&V	verification and validation
WRW	Wildlife Refuge Worker

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1.0 INTRODUCTION

This data summary report summarizes characterization activities conducted at Individual Hazardous Substance Site (IHSS) Group 900-4&5 at the Rocky Flats Environmental Technology Site (RFETS) in Golden, Colorado. Characterization activities were planned and executed in accordance with the Industrial Area Sampling and Analysis Plan (IASAP) (DOE 2001) and IASAP Addendum #IA-02-02 (DOE 2002a).

IHSS Group 900-4&5 consists of Potential Area of Concern (PAC) 900-175, S&W Building 980 Contractor Storage Facility and PAC-1308, Gasoline Spill Outside of Building 980. PAC-1308 received a No Further Action (NFA) determination on February 14, 2002 and is consequently not included in this report. The location of PAC 900-175 is shown on Figure 1.

2.0 SITE CHARACTERIZATION

IHSS Group 900-4&5 information consists of historical knowledge (DOE 1992-2001), previous sampling data from nine sampling locations (DOE 2002a), and six additional sampling locations with specifications as described in IASAP Addendum #IA-02-02 (DOE 2002a). The sampling specifications for the most recent characterization samples collected are listed in Table 1. The location of these samples and analytical results greater than background mean plus two standard deviations or detection/reporting limits are presented in Figure 2 and Table 2. A summary of the analytical results is presented in Table 3. Deviations from planned sampling specifications are presented in Table 4. A summary of validated analytical records is presented in Table 5. The raw data are presented as Appendix A.

Analytical results from the previous and the most recent sampling events indicate that all contaminant concentrations are less than Rocky Flats Cleanup Agreement (RFCA) Tier II action levels (ALs) and the RFCA Wildlife Refuge Worker (WRW) ALs. A comparison of the most recent analytical results to the RFCA WRW ALs is presented in Appendix B.

All analytical results indicate that No Further Accelerated Action (NFAA) for IHSS Group 900-4&5 is warranted for the following reasons:

- All contaminant concentrations are less than WRW ALs.
- All contaminant concentrations are less than Site Ecological Receptor ALs.
- There is no identified potential to exceed surface water standards at a Point of Compliance (POC) from this IHSS Group.

A subsurface soil risk screen is not required because these IHSSs were the result of surface soil spills and subsurface soil was not evaluated.

Approval of this Data Summary Report constitutes regulatory agency concurrence of this IHSS Group as an NFAA. This information and NFAA determination will be documented in the FY03 Historical Release Report (HRR).

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Table 1
PAC 900-175 –Characterization Sampling Specifications

IHSS Group	IHSS/PAC/UBC Site	Location Code	Easting	Northing	Media	Depth Interval	Analyte	Laboratory Method
900-4&5	PAC 900-175, S&W Building 980 Contractor Storage Facility	CL43-0002	2084965.91	750060.59	surface soil	A	metals radionuclides SVOCs nitrite/nitrate	6010 HPGe 8270 9056
		CK43-0002	2084929.95	750062.37	surface soil	A	metals radionuclides SVOCs nitrite/nitrate	6010 HPGe 8270 9056
		CK43-0001	2084894	750064.16	surface soil	A	metals radionuclides SVOCs nitrite/nitrate	6010 HPGe 8270 9056
		CL43-0001	2084985.43	750090.83	surface soil	A	metals radionuclides SVOCs nitrite/nitrate	6010 HPGe 8270 9056
		CL43-0000	2084949.48	750092.62	surface soil	A	metals radionuclides SVOCs nitrite/nitrate	6010 HPGe 8270 9056
		CK43-0000	2084913.52	750094.40	surface soil	A	metals radionuclides SVOCs nitrite/nitrate	6010 HPGe 8270 9056

Table 2
PAC 900-175 – Surface Soil Greater than Background Mean Plus Two Standard Deviations or Reporting Limits

IHSS/PAC/UBC Site	Location Code	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Reporting Limit	Tier I Action Level	Tier II Action Level	Background Mean +2SD	Unit
900-175	CK43-000	2084949.95	750075.39	Benzo(a)anthracene	0	0.5	100	40	614000	6140	NA	ug/kg
900-175	CK43-000	2084949.95	750075.39	Benzo(a)pyrene	0	0.5	140	97	61400	614	NA	ug/kg
900-175	CK43-000	2084949.95	750075.39	Benzo(b)fluoranthene	0	0.5	130	100	614000	6140	NA	ug/kg
900-175	CK43-000	2084949.95	750075.39	Benzo(k)Fluoranthene	0	0.5	150	96	6140000	61400	NA	ug/kg
900-175	CK43-000	2084949.95	750075.39	Bis(2-ethylhexyl)phthalate	0	0.5	82	71	32000000	320000	NA	ug/kg
900-175	CK43-000	2084949.95	750075.39	Chromium	0	0.5	106	0.36	44300	4410	16.99	mg/kg
900-175	CK43-000	2084949.95	750075.39	Chrysene	0	0.5	150	55	61400000	614000	NA	ug/kg
900-175	CK43-000	2084949.95	750075.39	Copper	0	0.5	31.9	0.19	71100	71100	18.06	mg/kg
900-175	CK43-000	2084949.95	750075.39	Fluoranthene	0	0.5	330	87	76800000	76800000	NA	ug/kg
900-175	CK43-000	2084949.95	750075.39	Indeno(1,2,3-cd)pyrene	0	0.5	73	49	614000	6140	NA	ug/kg
900-175	CK43-000	2084949.95	750075.39	Nickel	0	0.5	67.9	0.44	38400	38400	14.91	mg/kg
900-175	CK43-000	2084949.95	750075.39	Pyrene	0	0.5	290	41	57600000	57600000	NA	ug/kg
900-175	CK43-000	2084949.95	750075.39	Zinc	0	0.5	171	0.59	576000	576000	73.76	mg/kg
900-175	CK43-001	2084913.40	750094.41	Benzo(a)anthracene	0	0.5	180	41	614000	6140	NA	ug/kg
900-175	CK43-001	2084913.40	750094.41	Benzo(a)pyrene	0	0.5	230	99	61400	614	NA	ug/kg
900-175	CK43-001	2084913.40	750094.41	Benzo(b)fluoranthene	0	0.5	240	110	614000	6140	NA	ug/kg
900-175	CK43-001	2084913.40	750094.41	Benzo(k)Fluoranthene	0	0.5	230	98	6140000	61400	NA	ug/kg
900-175	CK43-001	2084913.40	750094.41	Bis(2-ethylhexyl)phthalate	0	0.5	75	73	32000000	320000	NA	ug/kg
900-175	CK43-001	2084913.40	750094.41	Chromium	0	0.5	40.3	0.35	44300	4410	16.99	mg/kg
900-175	CK43-001	2084913.40	750094.41	Chrysene	0	0.5	260	56	61400000	614000	NA	ug/kg
900-175	CK43-001	2084913.40	750094.41	Copper	0	0.5	28.1	0.18	71100	71100	18.06	mg/kg
900-175	CK43-001	2084913.40	750094.41	Dimethly phthalate	0	0.5	110	89	1000000000	1000000000	NA	ug/kg
900-175	CK43-001	2084913.40	750094.41	Fluoranthene	0	0.5	550	88	76800000	76800000	NA	ug/kg
900-175	CK43-001	2084913.40	750094.41	Indeno(1,2,3-cd)pyrene	0	0.5	150	50	614000	6140	NA	ug/kg
900-175	CK43-001	2084913.40	750094.41	Nickel	0	0.5	30.5	0.43	38400	38400	14.91	mg/kg
900-175	CK43-001	2084913.40	750094.41	Pyrene	0	0.5	470	42	57600000	57600000	NA	ug/kg

IHSS/PAC/UBC Site	Location Code	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Reporting Limit	Tier I Action Level	Tier II Action Level	Background Mean +2SD	Unit
900-175	CK43-001	2084913.40	750094.41	Zinc	0	0.5	96.9	0.57	576000	576000	73.76	mg/kg
900-175	CK43-002	2084894.08	750064.21	Benzo(a)anthracene	0	0.5	210	40	614000	6140	NA	ug/kg
900-175	CK43-002	2084894.08	750064.21	Benzo(a)pyrene	0	0.5	240	96	61400	614	NA	ug/kg
900-175	CK43-002	2084894.08	750064.21	Benzo(b)fluoranthene	0	0.5	230	100	614000	6140	NA	ug/kg
900-175	CK43-002	2084894.08	750064.21	Benzo (K) Fluoranthene	0	0.5	240	95	6140000	61400	NA	ug/kg
900-175	CK43-002	2084894.08	750064.21	Bis(2-ethylhexyl)phthalate	0	0.5	310	70	32000000	320000	NA	ug/kg
900-175	CK43-002	2084894.08	750064.21	Chromium	0	0.5	102	0.36	44300	4410	16.99	mg/kg
900-175	CK43-002	2084894.08	750064.21	Chrysene	0	0.5	260	54	61400000	614000	NA	ug/kg
900-175	CK43-002	2084894.08	750064.21	Copper	0	0.5	74.4	0.18	71100	71100	18.06	mg/kg
900-175	CK43-002	2084894.08	750064.21	Dibenz(a,h)anthracene	0	0.5	64	48	61400	614	NA	ug/kg
900-175	CK43-002	2084894.08	750064.21	Dimethly phthalate	0	0.5	320	86	1000000000	1000000000	NA	ug/kg
900-175	CK43-002	2084894.08	750064.21	Fluoranthene	0	0.5	540	85	76800000	76800000	NA	ug/kg
900-175	CK43-002	2084894.08	750064.21	Indeno(1,2,3-cd)pyrene	0	0.5	160	49	614000	6140	NA	ug/kg
900-175	CK43-002	2084894.08	750064.21	Nickel	0	0.5	69.3	0.44	38400	38400	14.91	mg/kg
900-175	CK43-002	2084894.078	750064.21	Pyrene	0	0.5	500	41	57600000	57600000	NA	ug/kg
900-175	CK43-002	2084894.078	750064.21	Zinc	0	0.5	172	0.58	576000	576000	73.76	mg/kg
900-175	CL43-000	2084913.25	750078.42	Benzo(a)anthracene	0	0.5	44	40	614000	6140	NA	ug/kg
900-175	CL43-000	2084913.25	750078.42	Bis(2-ethylhexyl)phthalate	0	0.5	9700	140	32000000	320000	NA	ug/kg
900-175	CL43-000	2084913.25	750078.42	Chromium	0	0.5	34.4	0.35	44300	4410	16.99	mg/kg
900-175	CL43-000	2084913.25	750078.42	Chrysene	0	0.5	58	54	61400000	614000	NA	ug/kg
900-175	CL43-000	2084913.25	750078.42	Copper	0	0.5	19.5	0.18	71100	71100	18.06	mg/kg
900-175	CL43-000	2084913.25	750078.42	Fluoranthene	0	0.5	120	86	76800000	76800000	NA	ug/kg
900-175	CL43-000	2084913.25	750078.42	Nickel	0	0.5	20.2	0.43	38400	38400	14.91	mg/kg
900-175	CL43-000	2084913.25	750078.42	Pyrene	0	0.5	100	41	57600000	57600000	NA	ug/kg
900-175	CL43-000	2084913.25	750078.42	Pyrene	0	0.5	100	82	57600000	57600000	NA	ug/kg
900-175	CL43-000	2084913.25	750078.42	Zinc	0	0.5	80.6	0.57	576000	576000	73.76	mg/kg
900-175	CL43-001	2084949.49	750092.67	Benzo(a)anthracene	0	0.5	310	39	614000	6140	NA	ug/kg
900-175	CL43-001	2084949.49	750092.67	Benzo(a)pyrene	0	0.5	270	95	61400	614	NA	ug/kg
900-175	CL43-001	2084949.49	750092.67	Benzo(b)fluoranthene	0	0.5	240	100	614000	6140	NA	ug/kg
900-175	CL43-001	2084949.49	750092.67	Benzo (K) Fluoranthene	0	0.5	290	94	6140000	61400	NA	ug/kg

IHSS/PAC/UBC Site	Location Code	Easting	Northing	Analyte	Depth Start (feet)	Depth End (feet)	Result	Reporting Limit	Tier I Action Level	Tier II Action Level	Background Mean +2SD	Unit
900-175	CL43-001	2084949.48	750092.62	Bis(2-ethylhexyl)phthalate	0	0.5	100	70	32000000	320000	NA	ug/kg
900-175	CL43-001	2084949.48	750092.62	Chromium	0	0.5	114	0.35	44300	4410	16.99	mg/kg
900-175	CL43-001	2084949.48	750092.62	Chrysene	0	0.5	390	54	61400000	614000	NA	ug/kg
900-175	CL43-001	2084949.48	750092.62	Copper	0	0.5	36.6	0.18	71100	71100	18.06	mg/kg
900-175	CL43-001	2084949.48	750092.62	Fluoranthene	0	0.5	690	85	76800000	76800000	NA	ug/kg
900-175	CL43-001	2084949.48	750092.62	Indeno(1,2,3-cd)pyrene	0	0.5	150	49	614000	6140	NA	ug/kg
900-175	CL43-001	2084949.48	750092.62	Iron	0	0.5	18900	1.6	576000	576000	18037	mg/kg
900-175	CL43-001	2084949.48	750092.62	Lithium	0	0.5	11.6	0.24	38400	38400	11.55	mg/kg
900-175	CL43-001	2084949.48	750092.62	Nickel	0	0.5	69.7	0.43	38400	38400	14.91	mg/kg
900-175	CL43-001	2084949.48	750092.62	Pyrene	0	0.5	690	40	57600000	57600000	NA	ug/kg
900-175	CL43-001	2084949.48	750092.62	Zinc	0	0.5	80.5	0.58	576000	576000	73.76	mg/kg
900-175	CL43-002	2084985.46	750090.89	Benzo(a)anthracene	0	0.5	160	41	614000	6140	NA	ug/kg
900-175	CL43-002	2084985.46	750090.89	Benzo(a)pyrene	0	0.5	190	98	61400	614	NA	ug/kg
900-175	CL43-002	2084985.46	750090.89	Benzo(b)fluoranthene	0	0.5	170	100	614000	6140	NA	ug/kg
900-175	CL43-002	2084985.46	750090.89	Benzo (K) Fluoranthene	0	0.5	200	97	6140000	61400	NA	ug/kg
900-175	CL43-002	2084985.46	750090.89	Bis(2-ethylhexyl)phthalate	0	0.5	1600	71	32000000	320000	NA	ug/kg
900-175	CL43-002	2084985.46	750090.89	Chromium	0	0.5	28.2	0.36	44300	4410	16.99	mg/kg
900-175	CL43-002	2084985.46	750090.89	Chrysene	0	0.5	210	55	61400000	614000	NA	ug/kg
900-175	CL43-002	2084985.46	750090.89	Copper	0	0.5	31.5	0.19	71100	71100	18.06	mg/kg
900-175	CL43-002	2084985.46	750090.89	Fluoranthene	0	0.5	440	87	76800000	76800000	NA	ug/kg
900-175	CL43-002	2084985.46	750090.89	Indeno(1,2,3-cd)pyrene	0	0.5	110	50	614000	6140	NA	ug/kg
900-175	CL43-002	2084985.46	750090.89	Lithium	0	0.5	11.8	0.25	38400	38400	11.55	mg/kg
900-175	CL43-002	2084985.46	750090.89	Nickel	0	0.5	23.8	0.45	38400	38400	14.91	mg/kg
900-175	CL43-002	2084985.46	750090.89	Pyrene	0	0.5	450	42	57600000	57600000	NA	ug/kg
900-175	CL43-002	2084985.46	750090.89	Strontium	0	0.5	63.2	0.016	1000000	1000000	48.94	mg/kg

NA = not applicable
SD = standard deviation

Table 3
PAC 900-175 - Summary of Analytical Results

Analyte	Total Number Samples Analyzed	Detection Frequency	Maximum Concentration	Average Concentration	Tier I Action Level	Tier II Action Level	Background Mean +2SD	Unit
1,2,4-Trichlorobenzene	8	0.00%	190.625	335	19200000	19200000	NA	ug/kg
1,2-Dichlorobutane	8	0.00%	190.625	335	173000000	173000000	NA	ug/kg
1,3-Dichlorobenzene	8	0.00%	190.625	335	NA	NA	NA	ug/kg
1,4-Dichlorobutane	8	0.00%	190.625	335	18700000	187000	NA	ug/kg
2,4,5-Trichlorophenol	8	0.00%	190.625	335	192000000	192000000	NA	ug/kg
2,4,6-Trichlorophenol	8	0.00%	190.625	335	159000000	407000	NA	ug/kg
2,4-Dichlorophenol	8	0.00%	190.625	335	5760000	5760000	NA	ug/kg
2,4-Dimethylphenol	8	0.00%	190.625	335	38400000	38400000	NA	ug/kg
2,4-Dinitrophenol	8	0.00%	925	1650	3840000000	3840000	NA	ug/kg
2,4-Dinitrotoluene	8	0.00%	190.625	335	659000	6590	NA	ug/kg
2,6-Dinitrotoluene	8	0.00%	190.625	335	659000	6590	NA	ug/kg
2-Chloronaphthalene	8	0.00%	190.625	335	154000000	154000000	NA	ug/kg
2-Chlorophenol	8	0.00%	190.625	335	9610000	9610000	NA	ug/kg
2-Methylnaphthalene	8	0.00%	190.625	335	76800000	76800000	NA	ug/kg
2-Methylphenol	8	0.00%	190.625	335	96100000	96100000	NA	ug/kg
2-Nitroaniline	8	0.00%	925	1650	115000	115000	NA	ug/kg
2-Nitrophenol	8	0.00%	190.625	335	NA	NA	NA	ug/kg
3,3'-Dichlorobenzidine	8	0.00%	743.75	1300	996000	9960	NA	ug/kg
3-Nitroaniline	8	0.00%	925	1650	NA	NA	NA	ug/kg
4,6-Dinitro-2-Methylphenol	8	0.00%	925	1650	192000	192000	NA	ug/kg
4-Chloro-3-Methylphenol	8	0.00%	190.625	335	NA	NA	NA	ug/kg
4-Chloroaniline	8	0.00%	190.625	335	7680000	7680000	NA	ug/kg
4-Chlorophenyl Phenyl Ether	8	0.00%	190.625	335	NA	NA	NA	ug/kg
4-Methylphenol	8	0.00%	190.625	335	9610000	9610000	NA	ug/kg
4-Nitroaniline	8	0.00%	925	1650	NA	NA	NA	ug/kg
4-Nitrophenol	8	0.00%	925	1650	15400000	15400000	NA	ug/kg

Analyte	Total Number Samples Analyzed	Detection Frequency	Maximum Concentration	Average Concentration	Tier I Action Level	Tier II Action Level	Background Mean +2SD	Unit
Actinium-228	6	100.00%	1.586	2.28	NA	NA	NA	pCi/g
Acenaphthylene	8	0.00%	190.625	335	NA	NA	NA	ug/kg
Acenapthene	8	0.00%	190.625	335	115000000	115000000	NA	ug/kg
Aluminum	7	100.00%	11807.1429	14900	1000000	1000000	16902	mg/kg
Americium-241	6	0.00%	4.43	4.43	215	38	0.02	pCi/g
Anthracene	8	0.00%	190.625	335	576000000	576000000	NA	ug/kg
Antimony	7	57.14%	1.28071429	3.9	768	768	16.97	mg/kg
Arsenic	7	100.00%	3.88571429	5	NA	NA	10.09	mg/kg
Barium	7	100.00%	85.4714286	101	133000	133000	141.26	mg/kg
Benzo(A)Anthracene	8	87.50%	181.125	335	614000	6140	NA	ug/kg
Benzo(A)Pyrene	8	75.00%	215.625	335	61400	614	NA	ug/kg
Benzo(B)Fluoranthene	8	75.00%	206.875	335	614000	6140	NA	ug/kg
Benzo(Ghi)Perylene	8	75.00%	168.875	335	NA	NA	NA	ug/kg
Benzo(K)Fluoranthene	8	75.00%	218.125	335	6140000	61400	NA	ug/kg
Benzoic Acid	8	0.00%	925	1650	1000000000	1000000000	NA	ug/kg
Benzyl Alcohol	8	0.00%	190.625	335	576000000	576000000	NA	ug/kg
Beryllium	7	100.00%	0.39714286	0.52	104	1.03999996	0.97	mg/kg
Bismuth-212	6	100.00%	1.59	2.31	NA	NA	NA	pCi/g
Bismuth-214	6	100.00%	0.69233333	1	NA	NA	NA	pCi/g
Bis(2-Chlorethyl)Ether	8	0.00%	190.625	335	407000	4070.00024	NA	ug/kg
Bis(2-Chloroethoxy)Methane	8	0.00%	190.625	335	NA	NA	NA	ug/kg
Bis(2-Chloroisopropyl)Ether	8	0.00%	190.625	335	NA	NA	NA	ug/kg
Bis(2-Ethylhexyl)Phthalate	8	100.00%	2429.625	9700	32000000	320000	NA	ug/kg
Boron	7	85.71%	2.50642857	4.6	NA	NA	NA	mg/kg
Butyl Benzylphthalate	8	0.00%	190.625	335	384000000	384000000	NA	ug/kg
Cadmium	28	85.71%	0.25392857	0.85	1920	1920	1.61	mg/kg
Calcium	7	100.00%	24244.2857	55900	NA	NA	NA	mg/kg
Cesium-134	6	100.00%	0.03663333	0.0987	NA	NA	0.31	pCi/g

Analyte	Total Number Samples Analyzed	Detection Frequency	Maximum Concentration	Average Concentration	Tier I Action Level	Tier II Action Level	Background Mean +2SD	Unit
Chromium	7	100.00%	64.1571429	114	44300	4410	16.99	mg/kg
Chrysene	8	87.50%	226.625	390	61400000	614000	NA	ug/kg
Cobalt	7	100.00%	4.6	5.8	115000	115000	10.91	mg/kg
Copper	7	100.00%	34.4571429	74.4	71100	71100	18.1	mg/kg
Di-N-Butyl Phthalate	8	12.50%	185.625	335	NA	NA	NA	ug/kg
Di-N-Octylphthalate	8	0.00%	190.625	335	1000000000	38400000	NA	ug/kg
Dibenz(A,H)Anthracene	8	12.50%	177.375	335	61400	614	NA	ug/kg
Dibenzofuran	8	0.00%	190.625	335	7680000	7680000	NA	ug/kg
Diethyl Phthalate	8	0.00%	378.125	650	1000000000	1000000000	NA	ug/kg
Dimethly Phthalate	8	25.00%	201.25	335	1000000000	1000000000	NA	ug/kg
Fluoranthene	8	87.50%	416.875	690	76800000	76800000	NA	ug/kg
Fluorene	8	0.00%	190.625	335	76800000	76800000	NA	ug/kg
Hexachlorobenzene	8	0.00%	190.625	335	280000	2800	NA	ug/kg
Hexachlorobutadiene	8	0.00%	190.625	335	5750000	57500	NA	ug/kg
Hexachlorocyclopentadiene	8	0.00%	378.125	650	13300000	13300000	NA	ug/kg
Hexachloroethane	8	0.00%	190.625	335	125000000	320000	NA	ug/kg
Indeno(1,2,3-Cd)Pyrene	8	75.00%	154.75	335	614000	6140	NA	ug/kg
Iron	7	100.00%	15242.8571	18900	576000	576000	18037	mg/kg
Isophorone	8	0.00%	190.625	335	1000000000	4720000	NA	ug/kg
Potassium-40	6	100.00%	21.25	29	NA	NA	NA	pCi/g
Lead	7	100.00%	27.1857143	40.2	1000	1000	54.62	mg/kg
Lithium	7	100.00%	10.4428571	11.8	38400	38400	11.55	mg/kg
Magnesium	7	100.00%	2645.71429	3280	NA	NA	2849.30	mg/kg
Manganese	7	100.00%	182.571429	269	83600	83600	365.08	mg/kg
Mercury	7	100.00%	0.01965714	0.036	576	576	0.13	mg/kg
Molybdenum	7	100.00%	1.42714286	2.4	9610	9610	MA	mg/kg
N-Nitrosodi-N-Propylamine	8	0.00%	190.625	335	64000	640	NA	ug/kg
N-Nitrosodiphenylamine	8	0.00%	190.625	335	365000000	915000	NA	ug/kg

Analyte	Total Number Samples Analyzed	Detection Frequency	Maximum Concentration	Average Concentration	Tier I Action Level	Tier II Action Level	Background Mean +2SD	Unit
Naphthalene	8	0.00%	190.625	335	76800000	76800000	NA	ug/kg
Nickel	7	100.00%	43.4857143	69.7	38400	38400	14.9	mg/kg
Nitrate	7	100.00%	3.48571429	11.1	1000000	1000000	NA	mg/kg
Nitrite	7	85.71%	1.57857143	2.55	192000	192000	NA	mg/kg
Nitrobenzene	8	0.00%	190.625	335	961000	961000	NA	ug/kg
P-Bromodiphenyl Ether	8	0.00%	190.625	335	NA	NA	NA	ug/kg
Protactinium-234	6	100.00%	0	0	NA	NA	NA	pCi/g
Protactinium-234m	6	100.00%	0.61333333	3.68	NA	NA	NA	pCi/g
Lead-212	6	100.00%	1.505	2.03	NA	NA	NA	pCi/g
Lead-214	6	100.00%	0.7315	0.896	NA	NA	NA	pCi/g
Pentachlorophenol	8	0.00%	925	1650	14900000	37400	NA	ug/kg
Phenanthrene	8	87.50%	205.625	335	NA	NA	NA	ug/kg
Phenanthrene, 1-Methyl-	1	100.00%	550	550	NA	NA	NA	ug/kg
Phenol	8	0.00%	190.625	335	1000000000	1000000000	NA	ug/kg
Polonium-210	6	100.00%	0	0	NA	NA	NA	pCi/g
Potassium	7	100.00%	2505.71429	2920	NA	NA	2967.20	mg/kg
Pyrene	8	100.00%	363.75	690	57600000	57600000	NA	ug/kg
Radium-226	6	100.00%	2.68666667	3.64	NA	NA	NA	pCi/g
Selenium	7	28.57%	0.30857143	0.66	9610	9610	1.22	mg/kg
Silica	7	100.00%	416.142857	478	NA	NA	NA	mg/kg
Silver	7	0.00%	0.03307143	0.0335	9610	9610	NA	mg/kg
Sodium	7	0.00%	76.5	78	NA	NA	91.84	mg/kg
Strontium	7	100.00%	34.8428571	63.2	1000000	1000000	48.94	mg/kg
Thorium-231	6	100.00%	0.07583333	0.455	NA	NA	NA	pCi/g
Thallium	7	57.14%	0.56142857	0.93	NA	NA	NA	mg/kg
Thorium-230	6	100.00%	0	0	NA	NA	NA	pCi/g
Tin	7	100.00%	1.62857143	2.3	1000000	1000000	NA	mg/kg
Titanium	7	100.00%	225.928571	342	NA	NA	NA	mg/kg

Analyte	Total Number Samples Analyzed	Detection Frequency	Maximum Concentration	Average Concentration	Tier I Action Level	Tier II Action Level	Background Mean +2SD	Unit
Thallium-208	6	100.00%	0.52266667	0.704	NA	NA	NA	pCi/g
Uranium (total)	7	0.00%	2.85714286	2.9	NA	NA	NA	mg/kg
Uranium-235	6	0.00%	0	0	135	24	0.09	pCi/g
Uranium-238	6	0.00%	1.52933333	2.9	586	103	2	pCi/g
Vanadium	7	100.00%	27.1428571	30.4	13400	13400	45.59	mg/kg
Zinc	7	100.00%	104.8	172	576000	576000	73.76	mg/kg

SD = standard deviation
NA = not applicable

3.0 DEVIATIONS FROM PLANNED SAMPLING SPECIFICATIONS

Deviations from the planned sampling specifications described in IASAP Addendum #IA-02-02 (DOE 2002a) are presented in the following table.

Table 4
PAC 900-175 - Deviations from Planned Sampling Specifications

Sampling Location Code	Planned Easting	Planned Northing	Actual Easting	Actual Northing	Comments
CL43-0002	2084965.91	750060.59	2084985.46	750090.89	All sample location deviations resulted from utilities, structures, or auger refusal.
CK43-0002	2084929.95	750062.37	2084894.08	750064.21	
CL43-0001	2084985.43	750090.83	2084949.48	750092.62	
CL43-0000	2084949.48	750092.62	2084913.24	750078.42	
CK43-0000	2084913.52	750094.40	2084949.95	750075.39	

4.0 DATA QUALITY ASSESSMENT

The Data Quality Objectives (DQOs) for this project are described in the IASAP (DOE 2001). All DQOs for this project were achieved based on the following:

- Regulatory agency approved sampling program design (IASAP Addendum 02-02 [DOE 2002a);
- Collection of samples in accordance with the sampling design;
- Results of the Data Quality Assessment (DQA) as described in the following sections.

4.1 Data Quality Assessment Process

The DQA process ensures that the type, quantity and quality of environmental data used in decision making are defensible, and is based on the following guidance and requirements:

- EPA QA/G-4, 1994a, Guidance for the Data Quality Objective Process;
- EPA QA/G-9, 1998, Guidance for the Data Quality Assessment Process; Practical Methods for Data Analysis; and
- DOE Order 414.1A, 1999, Quality Assurance.

Verification and validation (V&V) of the data are the primary components of the DQA. The final data are compared with original project DQOs and evaluated with respect to project decisions; uncertainty within the decisions; and quality criteria required for the data, specifically precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS). Validation criteria are consistent with the following RFETS-specific documents and industry guidelines:

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- EPA 540/R-94/012, 1994b, USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review;
- EPA 540/R-94/013, 1994c, USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review; and
- Kaiser-Hill Company, L.L.C.(K-H) V&V Guidelines:
  - General Guidelines for Data Verification and Validation, DA-GR01-v1, 2002a.
  - V&V Guidelines for Isotopic Determinations by Alpha Spectrometry, DA-RC01-v1, 2002b.
  - V&V Guidelines for Volatile Organics, DA-SS01-v1, 2002c.
  - V&V Guidelines for Semivolatile Organics, DA-SS02-v1, 2002d.
  - V&V Guidelines for Metals, DA-SS05-v1, 2002e.
- Lockheed-Martin, 1997, Evaluation of Radiochemical Data Usability, ES/ER/MS-5.

This report will be submitted to the Comprehensive Environmental, Response, Compensation and Liability Act (CERCLA) Administrative Record (AR) for permanent storage 30 days after being provided to the Colorado Department of Public Health and Environment (CDPHE) and the U.S. Environmental Protection Agency (EPA).

4.2 Verification and Validation of Results

Verification ensures that data produced and used by the project are documented and traceable in accordance with quality requirements. Validation consists of a technical review of all data that directly support the project decisions so that any limitations of the data relative to project goals are delineated and the associated data are qualified accordingly. The V&V process defines the criteria that constitute data quality, namely PARCCS parameters. Data traceability and archival are also addressed. V&V criteria include the following:

- Chain-of-custody;
- Preservation and hold-times;
- Instrument calibrations;
- Preparation blanks;
- Interference check samples (metals);
- Matrix spikes/matrix spike duplicates (MS/MSD);
- Laboratory control samples (LCS);

- Field duplicate measurements;
- Chemical yield (radiochemistry);
- Required quantitation limits/minimum detectable activities (sensitivity of chemical and radiochemical measurements, respectively); and
- Sample analysis and preparation methods.

Evaluation of V&V criteria ensures that PARCCS parameters are satisfactory (i.e., within tolerances acceptable to the project). Satisfactory V&V of laboratory quality controls are captured through application of validation "flags"or qualifiers to individual records.

Raw hardcopy data (e.g., individual analytical data packages) are currently filed by RIN and are maintained by Kaiser-Hill Analytical Services Division; older hardcopies may reside in the Federal Center in Lakewood, Colorado. Electronic data are stored in the RFETS Soil and Water Database.

Both real and QC data, as of June 11, 2003 are included on the enclosed compact disks (CDs).

4.2.1 Accuracy

The following measures of accuracy were evaluated:

- Laboratory Control Sample Evaluation;
- Surrogate Evaluation;
- Field Blanks; and
- Sample Matrix Spike Evaluation.

Results are compared to method requirements and project goals. The results of these comparisons are summarized for RFCA COCs where the result could impact project decisions. Particular attention is paid to those values near ALs when quality control (QC) results could indicate unacceptable levels of uncertainty for decision-making purposes.

Laboratory Control Sample Evaluation

The frequency of LCS measurements, relative to each laboratory batch, is given in Table 5. LCS frequency was adequate based on at least one LCS per batch. The minimum and maximum LCS results are also tabulated, by chemical, for the entire project. While not all LCS results are within tolerances, project decisions based on AL exceedances were not affected. Any qualifications of results due to LCS performance exceeding upper or lower tolerance limits are captured in the V&V flags, described in the Completeness Section.

Surrogate Evaluation

The frequency of surrogate measurements, relative to each laboratory batch, is given in Table 6. Surrogate frequency was adequate based on at least one set per sample. The

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Table 5
Laboratory Control Sample Evaluation

CAS No.	Analyte	Result Type	Minimum	Maximum	Number of Laboratory Samples	Number of Laboratory Batches	Unit	Test Method
120-82-1	1,2,4-TRICHLOROBENZENE	LC	68	76	2	2	%REC	SW-846 8270B
121-14-2	2,4-DINITROTOLUENE	LC	75	85	2	2	%REC	SW-846 8270B
95-57-8	2-CHLOROPHENOL	LC	70	73	2	2	%REC	SW-846 8270B
83-32-9	ACENAPHTHENE	LC	69	74	2	2	%REC	SW-846 8270B
7429-90-5	ALUMINUM	LC	92	94	2	2	%REC	SW-846 6010/6010B
7440-36-0	ANTIMONY	LC	88	90	2	2	%REC	SW-846 6010/6010B
7440-38-2	ARSENIC	LC	91	92	2	2	%REC	SW-846 6010/6010B
7440-39-3	BARIUM	LC	93	95	2	2	%REC	SW-846 6010/6010B
7440-41-7	BERYLLIUM	LC	90	90	2	2	%REC	SW-846 6010/6010B
7440-43-9	CADMIUM	LC	91	93	2	2	%REC	SW-846 6010/6010B
7440-48-4	COBALT	LC	88	90	2	2	%REC	SW-846 6010/6010B
7440-50-8	COPPER	LC	90	91	2	2	%REC	SW-846 6010/6010B
7439-89-6	IRON	LC	97	100	2	2	%REC	SW-846 6010/6010B
7439-92-1	LEAD	LC	90	93	2	2	%REC	SW-846 6010/6010B
7439-93-2	LITHIUM	LC	95	100	2	2	%REC	SW-846 6010/6010B
7439-96-5	MANGANESE	LC	91	93	2	2	%REC	SW-846 6010/6010B
7439-97-6	MERCURY	LC	93	93	1	1	%REC	SW-846 6010/6010B
98-7	MOLYBDENUM	LC	87	90	2	2	%REC	SW-846 6010/6010B
7440-02-0	NICKEL	LC	91	93	2	2	%REC	SW-846 6010/6010B
14797-55-8	NITRATE AS N	LC	94	95	2	2	%REC	SW9056 OR E300.0 PREP E300.0
14797-65-0	NITRITE AS N	LC	96	96	2	2	%REC	SW9056 OR E300.0 PREP E300.0
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	LC	70	72	2	2	%REC	SW-846 8270B
106-46-7	P-DICHLOROBENZENE	LC	68	73	2	2	%REC	SW-846 8270B
87-86-5	PENTACHLOROPHENOL	LC	66	70	2	2	%REC	SW-846 8270B
108-95-2	PHENOL	LC	70	75	2	2	%REC	SW-846 8270B
100-02-7	P-NITROPHENOL	LC	62	66	2	2	%REC	SW-846 8270B
129-00-0	PYRENE	LC	63	72	2	2	%REC	SW-846 8270B
7782-49-2	SELENIUM	LC	89	93	2	2	%REC	SW-846 6010/6010B
7440-22-4	SILVER	LC	92	93	2	2	%REC	SW-846 6010/6010B
7440-24-6	STRONTIUM	LC	92	94	2	2	%REC	SW-846 6010/6010B
7440-31-5	TIN	LC	88	89	2	2	%REC	SW-846 6010/6010B
7440-62-2	VANADIUM	LC	90	91	2	2	%REC	SW-846 6010/6010B
7440-66-6	ZINC	LC	90	95	2	2	%REC	SW-846 6010/6010B

Table 6
Surrogate Recovery Summary

VOC Surrogate Recoveries				
Number of Samples	Analyte	Minimum	Maximum	Unit Code
2	1,2-DICHLOROETHANE-D4	90	94	%REC
2	4-BROMOFLUOROBENZENE	94	95	%REC
2	TOLUENE-D8	95	95	%REC
SVOC Surrogate Recoveries				
Number of Samples	Analyte	Minimum	Maximum	Unit Code
12	TERPHENYL-D14	69	88	%REC
12	2-FLUOROBIPHENYL	65	83	%REC
12	2-FLUOROPHENOL	60	79	%REC
12	NITROBENZENE-D5	59	79	%REC

minimum and maximum surrogate results are also tabulated, by chemical, for the entire project. Any qualifications of results due to surrogate results are captured in the V&V flags, described in the Completeness Section.

Field Blank Evaluation

Results of the field blank analyses are given in Table 7. Detectable amounts of contaminants within the blanks, which could indicate possible cross-contamination of samples, are evaluated if the same contaminant is detected in the associated real samples. When the real result is less than 10 times the blank result for laboratory contaminants and 5 times the result for non-laboratory contaminants, the real result is eliminated. None of the chemicals detected in blanks were detected at concentrations greater than ALs, therefore no significant blank contamination is indicated.

Table 7
Field Blank Summary

Sample QC Code	Test Method Name	Analyte	Maximum Detected Value	Unit
RB	GAMMA	Uranium-235	0.2	pCi/g
RB	GAMMA	Uranium-238	4	pCi/g
FB	SW8260B	Toluene	2	ug/L
RB	SW8260B	Toluene	0.3	ug/L
FB	SW8260B	2-Butanone	4	ug/L
FB	SW8260B	Naphthalene	0.8	ug/L
Field Blanks (Trip, Rinse, Field) results greater than detection limits (not *U* Qualified)				

Sample Matrix Spike Evaluation

The frequency of MS measurements, relative to each laboratory batch, was adequate based on at least one MS per batch. The minimum and maximum of MS results are summarized by chemical, for the entire project in Table 8. Although low recovery values may indicate negative bias for some analytes, recovery values alone do not result in

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rejection of results. Qualifications of results due to spike recoveries out of tolerance are captured in electronic flagging of the results.

Table 8
Sample Matrix Spike Evaluation

CAS No.	Analyte	Result Type	Minimum	Maximum	Number of Laboratory Samples	Number of Laboratory Batches	Unit	Test Method
120-82-1	1,2,4-TRICHLOROBENZENE	MS	62	68	2	2	%REC	SW-846 8270B
121-14-2	2,4-DINITROTOLUENE	MS	70	85	2	2	%REC	SW-846 8270B
95-57-8	2-CHLOROPHENOL	MS	64	70	2	2	%REC	SW-846 8270B
83-32-9	ACENAPHTHENE	MS	64	75	2	2	%REC	SW-846 8270B
7429-90-5	ALUMINUM	MS	98	314	3	3	%REC	SW-846 6010/6010B
7440-36-0	ANTIMONY	MS	35	97	3	3	%REC	SW-846 6010/6010B
7440-38-2	ARSENIC	MS	91	97	3	3	%REC	SW-846 6010/6010B
7440-39-3	BARIUM	MS	102	103	3	3	%REC	SW-846 6010/6010B
7440-41-7	BERYLLIUM	MS	91	97	3	3	%REC	SW-846 6010/6010B
7440-43-9	CADMIUM	MS	90	100	3	3	%REC	SW-846 6010/6010B
7440-48-4	COBALT	MS	88	97	3	3	%REC	7440-48-4
7440-50-8	COPPER	MS	97	108	3	3	%REC	7440-50-8
7439-89-6	IRON	MS	102	672	3	3	%REC	7439-89-6
7439-92-1	LEAD	MS	94	99	3	3	%REC	7439-92-1
7439-93-2	LITHIUM	MS	100	105	3	3	%REC	7439-93-2
7439-96-5	MANGANESE	MS	98	100	3	3	%REC	7439-96-5
7439-97-6	MERCURY	MS	48	48	1	1	%REC	7439-97-6
7439-98-7	MOLYBDENUM	MS	83	98	3	3	%REC	7439-98-7
7440-02-0	NICKEL	MS	98	117	3	3	%REC	7440-02-0
14797-55-8	NITRATE AS N	MS	94	94	1	1	%REC	14797-55-8
14797-55-8	NITRATE AS N	MS	89	89	1	1	%REC	14797-55-8
14797-65-0	NITRITE AS N	MS	100	100	1	1	%REC	14797-65-0
14797-65-0	NITRITE AS N	MS	91	91	1	1	%REC	14797-65-0
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	MS	63	67	2	2	%REC	621-64-7
106-46-7	P-DICHLOROBENZENE	MS	60	65	2	2	%REC	106-46-7
87-86-5	PENTACHLOROPHENOL	MS	52	52	2	2	%REC	87-86-5
108-95-2	PHENOL	MS	64	71	2	2	%REC	108-95-2
100-02-7	P-NITROPHENOL	MS	60	61	2	2	%REC	100-02-7
129-00-0	PYRENE	MS	65	76	2	2	%REC	129-00-0
7782-49-2	SELENIUM	MS	90	96	3	3	%REC	7782-49-2
7440-22-4	SILVER	MS	90	102	3	3	%REC	7440-22-4
7440-24-6	STRONTIUM	MS	99	101	3	3	%REC	7440-24-6
7440-31-5	TIN	MS	85	97	3	3	%REC	7440-31-5
7440-62-2	VANADIUM	MS	100	121	3	3	%REC	7440-62-2
7440-66-6	ZINC	MS	78	98	3	3	%REC	7440-66-6

4.2.2 Precision

Matrix Spike Duplicate Evaluation

Laboratory precision is measured through use of MSD. Adequate frequency of MSD measurements is indicated by at least one MSD in each laboratory batch. Although some RPD values, listed in Table 9, exceed the maximum target of 35 percent, all sample results were repeatable at concentrations well below their respective ALs.

Table 9
Sample Matrix Spike Duplicate Evaluation

Analyte Name	Number of Sample Pairs	Number of Laboratory Batches	Max RPD (%)
1,2,4-TRICHLOROBENZENE	2	2	8
2,4-DINITROTOLUENE	2	2	8
2-CHLOROPHENOL	2	2	8
ACENAPHTHENE	2	2	5
ALUMINUM	3	3	3
ANTIMONY	3	3	1
ARSENIC	3	3	7
BARIUM	3	3	9
BERYLLIUM	3	3	6
CADMIUM	3	3	6
CADMIUM	3	3	6
COBALT	3	3	7
COPPER	3	3	25
IRON	3	3	98
LEAD	3	3	121
LITHIUM	3	3	7
MANGANESE	3	3	43
MERCURY	1	1	33
MOLYBDENUM	3	3	6
NICKEL	3	3	75
NITRATE AS N	1	1	1
NITRATE AS N	1	1	5
NITRITE AS N	1	1	1
NITRITE AS N	1	1	4
N-NITROSO-DI-N-PROPYLAMINE	2	2	9
P-DICHLOROBENZENE	2	2	7
PENTACHLOROPHENOL	2	2	7
PHENOL	2	2	11
P-NITROPHENOL	2	2	5
PYRENE	2	2	3
SELENIUM	3	3	5
SILVER	3	3	7
STRONTIUM	3	3	11

Analyte Name	Number of Sample Pairs	Number of Laboratory Batches	Max RPD (%)
TIN	3	3	6
VANADIUM	3	3	10
ZINC	3	3	12

Field Duplicate Evaluation

Field duplicate results reflect sampling precision, or overall repeatability of the sampling process. The frequency of field duplicate collection should exceed 1 field duplicate per 20 real samples, or 5 percent. Table 10 indicates that sampling frequencies were adequate. A common metric for evaluating precision is the relative percent difference (RPD) value; RPD values are given in Table 11. Ideally, RPDs of less than 35 percent (in soil) indicate satisfactory precision. Values exceeding 35 percent only affect project decisions if the imprecision is great enough to cause contradictory decisions relative to the contaminant of concern (COC) (i.e., one sample indicates clean soil whereas the QC partner does not). As indicated by the data in Table 11, a number of analytes, generally SVOCs, have RPDs greater than 35 percent. However, all samples for these suites, real and duplicate, were repeatable at concentrations well below ALs; consequently, the high RPD values do not affect project decisions.

Table 10
Field Duplicate Sample Frequency

Test Method Name	Sample Code	Number of Samples	% Duplicate Samples
GAMMA SPECTROSCOPY	REAL	6	0
SW-846 6010/6010B	REAL	6	17
SW-846 6010/6010B	DUP	1	
SW-846 8270B	REAL	6	17
SW-846 8270B	DUP	1	
SW9056 OR E300.0 PREP E300.0	REAL	6	17
SW9056 OR E300.0 PREP E300.0	DUP	1	

Table 11
RPD Evaluation

Analyte	Max of RPD %
1,2,4-TRICHLOROBENZENE	0
2,4,5-TRICHLOROPHENOL	0
2,4,6-TRICHLOROPHENOL	0
2,4-DICHLOROPHENOL	0
2,4-DIMETHYLPHENOL	0

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2,4-DINITROPHENOL	0
2,4-DINITROTOLUENE	0
2,6-DINITROTOLUENE	0
2-CHLORONAPHTHALENE	0
2-CHLOROPHENOL	0
2-NITROANILINE	0
4-CHLOROANILINE	0
ACENAPHTHENE	0
ALUMINUM	2
ANTHRACENE	0
ANTIMONY	26
ARSENIC	8
BARIUM	5
BENZO(A)ANTHRACENE	37
BENZO(A)PYRENE	24
BENZO(B)FLUORANTHENE	19
BENZO(K)FLUORANTHENE	42
BENZOIC ACID	0
BERYLLIUM	29
BIS(2-ETHYLHEXYL)PHTHALATE	162
BUTYLBENZYLPHTHALATE	0
CHRYSENE	33
COBALT	2
COPPER	49
DIBENZ(A,H)ANTHRACENE	0
DIBENZOFURAN	0
FLUORANTHENE	29
FLUORENE	0
HEXACHLOROBENZENE	0
HEXACHLOROBUTADIENE	0
HEXACHLOROCYCLOPENTADIENE	1
HEXACHLOROETHANE	0
INDENO(1,2,3-CD)PYRENE	20
IRON	17
ISOPHORONE	0
LEAD	57
LITHIUM	6
MANGANESE	4
MERCURY	30
MOLYBDENUM	108
NAPHTHALENE	0
NICKEL	3
NITROBENZENE	0
N-NITROSODIPHENYLAMINE	0
PENTACHLOROPHENOL	0
PHENOL	0
PYRENE	37
SELENIUM	2
SILVER	0

STRONTIUM	21
TIN	34
VANADIUM	3
ZINC	2

Completeness

Based on original project DQOs, a minimum of 25 percent of ER Program analytical (and radiological) results must be formally verified and validated. Of that percentage, no more than 10 percent of the results may be rejected, which ensures that analytical laboratory practices are consistent with quality requirements. Table 12 shows the number and percentage of validated records (codes without "1"), the number and percentage of verified records (codes with "1"), and the percentage of rejected records for each analyte group. The frequency of validation is within project quality requirements for all suites except radionuclides. A check of hardcopy V&V records indicates that validation frequency is better than the minimum of 25 percent for both alpha and gamma spectroscopy, but the associated validation flags have not yet been uploaded to electronic records in the Soil Water Database (SWD). Following upload of the V&V flags to SWD, the validation frequency of electronic records will be acceptable.

The frequency of validation is in compliance with the RFETS validation goal of 25 percent of all analytical records indicating that these data are adequate.

4.2.3 Sensitivity

Reporting limits, in units of ug/kg for organics, mg/kg for metals, and pCi/g for radionuclides, were compared with proposed RFCA WRW and Ecological Receptor ALs. Adequate sensitivities of analytical methods were attained for all COCs that affect project decisions. "Adequate" sensitivity is defined as a reporting limit less than an analyte's associated AL, typically less than one-half the AL.

4.3 Summary of Data Quality

The RPDs greater than 35 percent indicate that the sampling precision limits some analytes has been exceeded. However, the imprecision does not affect project decisions because the only AL exceedances is arsenic. The arsenic RPD was less than 35 percent, and does not affect project decisions. No records were rejected. Compliance with the project quality requirements and RFETS validation goal of 25 percent of all analytical records indicates that these data are adequate. When additional V&V information is received, IHSS Group 900-4&5 records will be updated in SWD. Data qualified as a result of additional data will be assessed as part of the Comprehensive Risk Assessment process. Data collected and used for IHSS Group 900-4&5 are adequate for decision-making.

Table 12
Validation and Verification Summary

Validation Code	Number of Records	Radionuclides	Metals	Inorganics
No V&V	185	119	0	0
J	81	0	81	0
V	514	0	105	12
Total	780	119	186	12
Total Validated	595	0	186	12
% Validated	76%	0%	100%	100%
Total Verified	595	0	186	12
% Verified	76%	0%	100%	100%
% Rejected	0.00%	0.00%	0.00%	0.00%

KEY:
1, V1 - Verified
J, J1 - Estimated
UJ1 - Estimated detection limit
V - Validated

5.0 REFERENCES

DOE, 1992-2001, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, June.

DOE, 1999, Order 414.1A, Quality Assurance.

DOE, 2000, Rocky Flats Cleanup Agreement (RFCA), Attachment 5, March.

DOE, 2001, Industrial Area Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2002a, Industrial Area Sampling and Analysis Plan Addendum #IA-02-02, Rocky Flats Environmental Technology Site, Golden, Colorado, January.

DOE, 2002b, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation, Rocky Flats Environmental Technology Site, Golden, Colorado, January.

EPA QA/G-4, 1994a, Guidance for the Data Quality Objective Process.

EPA 540/R-94/012, 1994b, USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review.

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EPA QA/G-9, 1998, Guidance for the Data Quality Assessment Process; Practical Methods for Data Analysis.

Kaiser-Hill (K-H), 2002a, General Guidelines for Data Verification and Validation, DA-GR01-v1, December.

K-H, 2002b, V&V Guidelines for Volatile Organics, DA-SS01-v1, December.

K-H, 2002c, V&V Guidelines for Semivolatile Organics, DA-SS02-v1, December.

K-H, 2002d, V&V Guidelines for Metals, DA-SS05-v1, December.

K-H, 2002e, V&V Guidelines for Isotopic Determinations by Alpha Spectrometry, DA-RC01-v1, February.

Lockheed-Martin, 1997, Evaluation of Radiochemical Data Usability, ES/ER/MS-5.

APPENDIX A

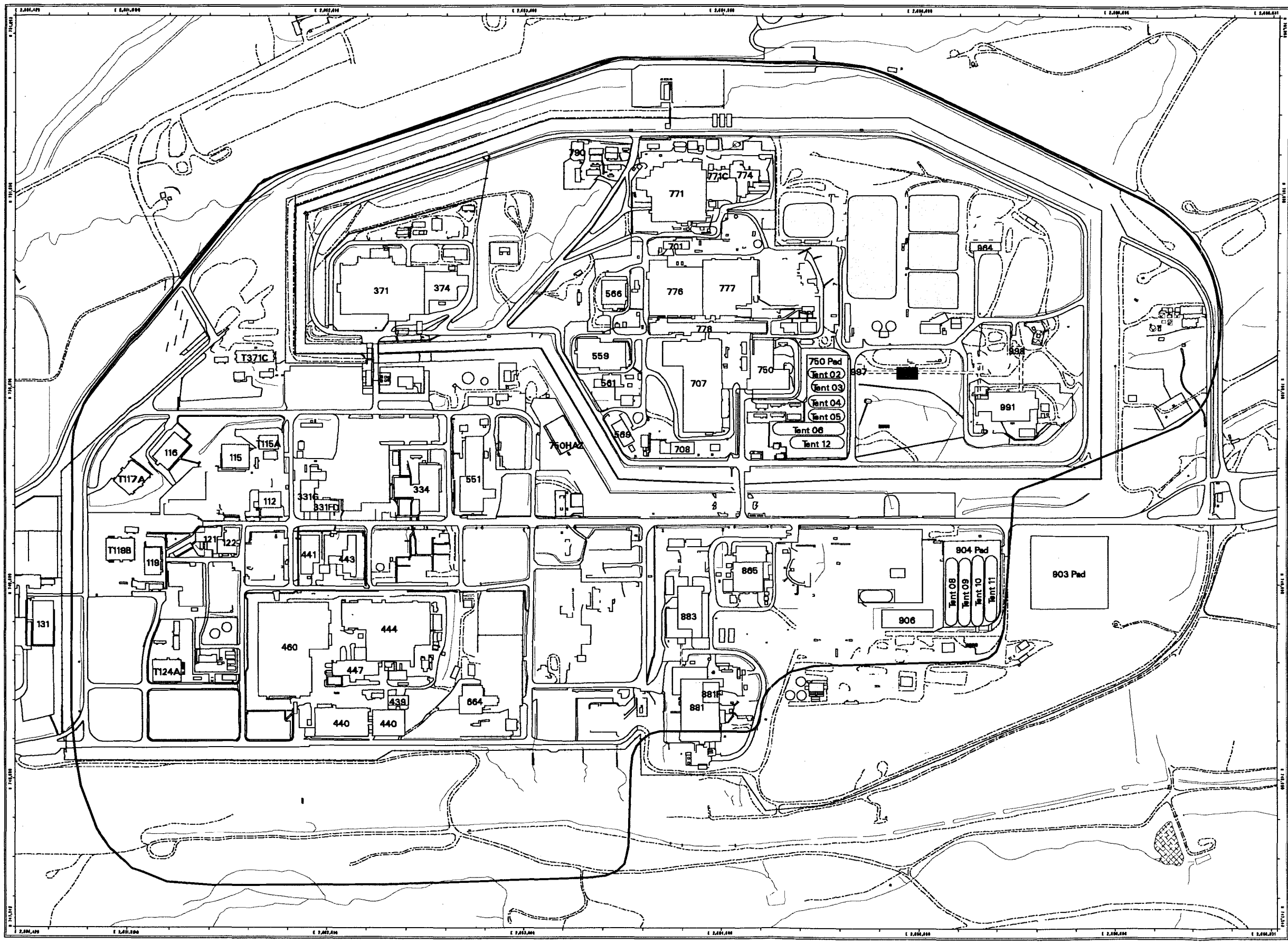
PAC 900-175 - RAW DATA

APPENDIX B

IHSS GROUP 900-4&5

WRW ACTION LEVEL COMPARISON TABLE

Figure 1
IA Location Map



EXPLANATION

IHSS Groupings

- IHSS 900-175

Standard Map Features

- Buildings and other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads
- Solar Evaporation Ponds (SEPs)
- Industrial Area Operable Unit Boundary

DATA SOURCE BASE FEATURES:
PACs
Historical Release Report (HRR)
2nd Annual Update
Sept. 30, 1987
Individual Hazardous Substance Sites (IHSS)
DOE, 1992, HRR Report and Subsequent Updates.
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs. 1/96

Scale = 1 : 6000
1 inch represents 500 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

GIS Dept. 303-966-7707

Prepared by: DynCorp — THE ART OF TECHNOLOGY

Prepared for: KAISER-HILL COMPANY

November 15, 2002

NT_Src w:/projects/er/fy03/ias/900-4-5/data_summary_reportihss_175.aml

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Figure 2
900-175 Surface Soil Results Greater than Background Mean Plus Two Standard Deviations or Reporting/Detection Limits

Location	Analyte	Result	RI	Tier_1	Tier_2	M+2sd	Units
CK43-001	Benzo(a)anthracene	180.00	41.00	614000.00	6140.00	NA	UG/KG
CK43-001	Benzo(a)pyrene	230.00	99.00	61400.00	614.00	NA	UG/KG
CK43-001	Benzo(b)fluoranthene	240.00	110.00	614000.00	6140.00	NA	UG/KG
CK43-001	BENZO(k)FLUORANTHENE	230.00	98.00	6140000.00	61400.00	NA	UG/KG
CK43-001	Bis(2-ethylhexyl)phthalate	75.00	73.00	32000000.00	320000.00	NA	UG/KG
CK43-001	CHROMIUM	40.30	0.35	44300.00	4410.00	17.0	MG/KG
CK43-001	Chrysene	260.00	56.00	61400000.00	614000.00	NA	UG/KG
CK43-001	Copper	28.10	0.18	71100.00	71100.00	18.1	MG/KG
CK43-001	Fluoranthene	550.00	88.00	76800000.00	76800000.00	NA	UG/KG
CK43-001	Indeno(1,2,3-cd)pyrene	150.00	50.00	614000.00	6140.00	NA	UG/KG
CK43-001	Nickel	30.50	0.43	38400.00	38400.00	14.9	MG/KG
CK43-001	Pyrene	470.00	42.00	57600000.00	57600000.00	NA	UG/KG
CK43-001	Zinc	96.90	0.57	576000.00	576000.00	73.8	MG/KG

Location	Analyte	Result	RI	Tier_1	Tier_2	M+2sd	Units
CL43-001	Benzo(a)anthracene	310.00	39.00	614000.00	6140.00	NA	UG/KG
CL43-001	Benzo(a)pyrene	270.00	95.00	61400.00	614.00	NA	UG/KG
CL43-001	Benzo(b)fluoranthene	240.00	100.00	614000.00	6140.00	NA	UG/KG
CL43-001	BENZO(k)FLUORANTHENE	290.00	94.00	6140000.00	61400.00	NA	UG/KG
CL43-001	Bis(2-ethylhexyl)phthalate	100.00	70.00	32000000.00	320000.00	NA	UG/KG
CL43-001	CHROMIUM	114.00	0.35	44300.00	4410.00	17.0	MG/KG
CL43-001	Chrysene	390.00	54.00	61400000.00	614000.00	NA	UG/KG
CL43-001	Copper	36.80	0.18	71100.00	71100.00	18.1	MG/KG
CL43-001	Fluoranthene	690.00	85.00	76800000.00	76800000.00	NA	UG/KG
CL43-001	Indeno(1,2,3-cd)pyrene	150.00	49.00	614000.00	6140.00	NA	UG/KG
CL43-001	Iron	18900.00	1.60	576000.00	576000.00	18000	MG/KG
CL43-001	Lithium	11.60	0.24	38400.00	38400.00	11.6	MG/KG
CL43-001	Nickel	69.70	0.43	38400.00	38400.00	14.9	MG/KG
CL43-001	Pyrene	690.00	40.00	57600000.00	57600000.00	NA	UG/KG
CL43-001	Zinc	80.50	0.58	576000.00	576000.00	73.8	MG/KG

Location	Analyte	Result	RI	Tier_1	Tier_2	M+2sd	Units
CL43-000	Benzo(a)anthracene	44.00	40.00	614000.00	6140.00	NA	UG/KG
CL43-000	Bis(2-ethylhexyl)phthalate	9700.00	140.00	32000000.00	320000.00	NA	UG/KG
CL43-000	CHROMIUM	34.40	0.35	44300.00	4410.00	17.0	MG/KG
CL43-000	Chrysene	58.00	54.00	61400000.00	614000.00	NA	UG/KG
CL43-000	Copper	19.50	0.18	71100.00	71100.00	18.1	MG/KG
CL43-000	Fluoranthene	120.00	86.00	76800000.00	76800000.00	NA	UG/KG
CL43-000	Nickel	20.20	0.43	38400.00	38400.00	14.9	MG/KG
CL43-000	Pyrene	100.00	41.00	57600000.00	57600000.00	NA	UG/KG
CL43-000	Pyrene	100.00	82.00	57600000.00	57600000.00	NA	UG/KG
CL43-000	Zinc	80.60	0.57	576000.00	576000.00	73.8	MG/KG

Location	Analyte	Result	RI	Tier_1	Tier_2	M+2sd	Units
CL43-002	Benzo(a)anthracene	160.00	41.00	614000.00	6140.00	NA	UG/KG
CL43-002	Benzo(a)pyrene	190.00	98.00	61400.00	614.00	NA	UG/KG
CL43-002	Benzo(b)fluoranthene	170.00	100.00	614000.00	6140.00	NA	UG/KG
CL43-002	BENZO(k)FLUORANTHENE	200.00	97.00	6140000.00	61400.00	NA	UG/KG
CL43-002	Bis(2-ethylhexyl)phthalate	1600.00	71.00	32000000.00	320000.00	NA	UG/KG
CL43-002	CHROMIUM	28.20	0.36	44300.00	4410.00	17.0	MG/KG
CL43-002	Chrysene	210.00	55.00	61400000.00	614000.00	NA	UG/KG
CL43-002	Copper	31.50	0.19	71100.00	71100.00	18.1	MG/KG
CL43-002	Fluoranthene	440.00	87.00	76800000.00	76800000.00	NA	UG/KG
CL43-002	Indeno(1,2,3-cd)pyrene	110.00	50.00	614000.00	6140.00	NA	UG/KG
CL43-002	Lithium	11.80	0.25	38400.00	38400.00	11.6	MG/KG
CL43-002	Nickel	23.80	0.45	38400.00	38400.00	14.9	MG/KG
CL43-002	Pyrene	450.00	42.00	57600000.00	57600000.00	NA	UG/KG
CL43-002	Strontium	63.20	0.02	1000000.00	1000000.00	48.9	MG/KG

Location	Analyte	Result	RI	Tier_1	Tier_2	M+2sd	Units
CK43-002	Benzo(a)anthracene	210.00	40.00	614000.00	6140.00	NA	UG/KG
CK43-002	Benzo(a)pyrene	240.00	96.00	61400.00	614.00	NA	UG/KG
CK43-002	Benzo(b)fluoranthene	230.00	100.00	614000.00	6140.00	NA	UG/KG
CK43-002	BENZO(k)FLUORANTHENE	240.00	95.00	6140000.00	61400.00	NA	UG/KG
CK43-002	Bis(2-ethylhexyl)phthalate	310.00	70.00	32000000.00	320000.00	NA	UG/KG
CK43-002	CHROMIUM	102.00	0.36	44300.00	4410.00	17.0	MG/KG
CK43-002	Chrysene	260.00	54.00	61400000.00	614000.00	NA	UG/KG
CK43-002	Copper	74.40	0.18	71100.00	71100.00	18.1	MG/KG
CK43-002	Dibenz(a,h)anthracene	64.00	48.00	61400.00	614.00	NA	UG/KG
CK43-002	Fluoranthene	540.00	85.00	76800000.00	76800000.00	NA	UG/KG
CK43-002	Indeno(1,2,3-cd)pyrene	160.00	49.00	614000.00	6140.00	NA	UG/KG
CK43-002	Nickel	69.30	0.44	38400.00	38400.00	14.9	MG/KG
CK43-002	Pyrene	500.00	41.00	57600000.00	57600000.00	NA	UG/KG
CK43-002	Zinc	172.00	0.58	576000.00	576000.00	73.8	MG/KG

Location	Analyte	Result	RI	Tier_1	Tier_2	M+2sd	Units
CK43-000	Benzo(a)anthracene	100.00	40.00	614000.00	6140.00	NA	UG/KG
CK43-000	Benzo(a)pyrene	140.00	97.00	61400.00	614.00	NA	UG/KG
CK43-000	Benzo(b)fluoranthene	130.00	100.00	614000.00	6140.00	NA	UG/KG
CK43-000	BENZO(k)FLUORANTHENE	150.00	96.00	6140000.00	61400.00	NA	UG/KG
CK43-000	Bis(2-ethylhexyl)phthalate	82.00	71.00	32000000.00	320000.00	NA	UG/KG
CK43-000	CHROMIUM	106.00	0.36	44300.00	4410.00	17.0	MG/KG
CK43-000	Chrysene	150.00	55.00	61400000.00	614000.00	NA	UG/KG
CK43-000	Copper	31.90	0.19	71100.00	71100.00	18.1	MG/KG
CK43-000	Fluoranthene	330.00	87.00	76800000.00	76800000.00	NA	UG/KG
CK43-000	Indeno(1,2,3-cd)pyrene	73.00	49.00	614000.00	6140.00	NA	UG/KG
CK43-000	Nickel	67.90	0.44	38400.00	38400.00	14.9	MG/KG
CK43-000	Pyrene	290.00	41.00	57600000.00	57600000.00	NA	UG/KG
CK43-000	Zinc	171.00	0.59	576000.00	576000.00	73.8	MG/KG

KEY

- Surface Soil Location
- IHSS
- Solar Ponds
- Building
- Original Process Waste Line
- Paved Area
- Dirt Road
- Stream

Bdg_ft = Soil Begin Depth Feet
End_ft = Soil End Depth Feet
RI = Reporting/Detection Limit
M+2sd = Background Mean Plus Two Standard Deviations

N W E S

40 0 40 80 Feet

Scale = 1: 850

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: RADMS Date: April 2003

Prepared for: KAISER•HILL COMPANY

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